Interviews with teachers and learners

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Over the past few months I have been interviewing teachers and learners about their understandings about teaching and learning. This paper follows from those interviews and begins to discuss what teachers and learners told me. From an individual perspective, interviewees discussed their motivations, ability assessments and strategies for teaching and learning. From a contextual perspective, interviewees spoke about social interactions, the relative ease of learning in practice and the enhanced learning to be gained from combining theory, practice and reflection. In this paper I also discuss comparisons and contrasts between interviewees' understandings and current recommendations for best practice found in extant teaching and learning literature.

Teachers, Learners, Understandings, Interviews, NUD*IST

INTRODUCTION

My review of philosophical, psychological and classroom practice literature suggests that teachers' and learners' understandings, intentions and plans for action are key determinants of teaching and learning behaviours (for example, see Bereiter & Scardamalia, 1989; Hirst, 1971; Kerr, 1981). The literature also reports many examples of *mis*understandings between teachers and learners (for example, see Cusworth, 1995; Hogan, 1999; Tasker & Freyberg, 1985; Winne & Marx, 1982). Understandings and misunderstandings seem worthy of further investigation.

The literature also highlights many advances that have been made in teaching and learning theory and pedagogy over the last thirty or so years (for an overview see Bransford, Brown, & Cocking, 1999). This added another dimension to my initial concern for whether teachers and learners share similar understandings: that is, whether those understandings reflect current theory and recommendations for best practice as reported by researchers and reflective practitioners.

BACKGROUND

This paper is founded upon three areas of theory and research, reflecting a growing awareness in the research community of the logic, utility and fruitfulness of *consilience*, "a 'jumping together' of knowledge by the linking of facts and fact-based theory across disciplines to create a common groundwork of explanation" (Wilson, 1998 p. 8): (for example Anderson, Greeno, Reder, & Simon, 2000; Cobb, 1994; Entwistle, Skinner, Entwistle, & Orr, 2000; Newsome III, 2000). These three foundations are

1. A philosophy of teaching and learning which prescribes that intentions predicate plans and actions, and which draws a distinction between schooling and teaching (Bereiter & Scardamalia, 1989; Kerr, 1981).

2. Social-cognitive theory, which proposes a transaction between cognition, behaviour and environment, in particular the motivational and self-regulatory aspects of human behaviour (Bandura, 1997; Schunk, 1995; Wigfield & Eccles, 2000; Winne, 1995).

3. Cognitive psychology and psychological-and sociological-constructivist principles of learning, including the implications of these for pedagogy (Anderson, 2000; Bransford et al., 1999; Phillips, 2000).

The importance of understandings

Eisner's (2000) first of twelve key lessons for educators is, "Students learn both less and more than what they have been taught" (p. 343):

> students must … create meaning for themselves and … (these meanings) … are not simply a function of what teachers intend them to learn. Students make meaning from the tools they bring with them … the backlogs of their experiences and the "languages" they know how to use …. (Eisner, 2000 p. 344)

Eisner took a positive view: that the diversity that comes from many students' perspectives is far preferable to a student army all marching to the same drum. Cobb (1994) also proposed that

> there are significant qualitative differences in the understandings that students develop in instructional situations, and that these understandings are frequently very different from those that the teacher intends. (p. 13)

Shunk (1995) stressed the importance of learners' perceptions as mediator effects in the self-regulatory aspects of the learning process:

> What is also important … [for self-regulation] … is the role of learners' perceptions of themselves (e.g. their competencies, interests, values), of others (teachers, parents, peers), and of learning environments (classrooms, environments, homes). These perceptions involve knowledge but are subjective and may conflict with knowledge possessed by learners or others. (p. 214)

Eisner's "tools," Cobb's "understandings" and Shunk's "perceptions" all suggest that learners come to learning situations pre-equipped with thoughts that mediate their learning experiences. I have adopted the broad term *understandings* to describe these thoughts and to focus my further investigations into this field. Of course, it is not only learners who bring understandings to teaching—learning settings: teachers do also (Kerr, 1981; Trigwell, Prosser, & Taylor, 1994).

Prior investigations

In some areas considerable investigations have been undertaken about teachers' and learners' understandings. For example, Perry (1970), Saljo (1979), and more recently, Marshall, Summers and Woolnough (1999), (see also Eklund-Myrskog, 1998; Klein, 1996; Marton, Dall'Alba, & Beaty, 1993; Taylor, 1996) have identified hierarchies of learners' *conceptions* of "What is learning?" Conceptions have ranged from increasing knowledge to change as a person. Another field of investigation has been concerned with people's knowing about knowing, or *epistemology* (Hofer, 2000; Hofer & Pintrich, 1997; Jakubowski & Tobin, 1997; Lampert, 1990; Schommer, 1990; 1993; Schommer, Crouse, & Rhodes, 1992). Hofer (2000) categorised people's epistemological beliefs into four dimensions: certainty, simplicity, source and justification.

A third field of investigation has been *approaches to studying*, perhaps best represented by the work of Biggs (Biggs, Kember, & Leung, 2001; Biggs, 1979; Biggs, 1987) in Australia and work by Entwistle, Hanley and Hounsell (1979) in England. Biggs proposed an interaction between motives -- extrinsic, intrinsic and achievement -- and deep- versus surface- study strategies. Together, motives and strategies become an approach to learning: surface or deep. Trigwell and Prosser (1996) (see also Prosser & Trigwell, 1997; Samuelowicz & Bain, 1992; Trigwell & Prosser, 1997; Trigwell et al., 1994) have conducted similar investigations with teachers' approaches to teaching. For example, a teacher who conceives of teaching as requiring an information transfer/teacher focussed approach may elicit surface learning responses in his or her students. However, a higher level "student centred" theory of teaching

requires teaching methods that have students actively involved in undertaking learning activities and constructing knowledge.

Of course, the perspectives of learners and teachers may differ. In a study of science teaching and learning Tasker (1992 p. 28) drew attention to a *gap* between teachers and students: "Often what I observed was two lessons, the teacher's and the learner's." This suggested possible mismatches between teachers' and learners' views of what a lesson is all about, including its purpose, procedures and outcomes (see also Osborne & Freyberg, 1980; Tasker, 1981; Tasker & Freyberg, 1985; Tasker & Osborne, 1983). Stigler and Hiebert's (1999) analysis of videotapes of mathematics teaching in different nations suggested that not only are there differences between individual teachers and learners, but also that noticeable differences are evident between different cultures' practices and expectations of teaching and learning.

Networks of understandings

Research into conceptions, epistemologies, approaches and teacher—learner congruence has been extensive. However, it has been confined to a fairly narrow range of understandings that teachers and learners might potentially bring to the teaching and learning situation. There are currently many active fields of research in educational psychology and yet there appears to be surprisingly little evidence documented about teachers' and learners' understandings about issues that arise from other contemporary theories of teaching and learning. For example, what do teachers and learners understand about

1. Achievement goals (Pintrich, 2000)
2. Theories of intelligence (Dweck, 1999)
3. Self-regulated learning (Zimmerman, 1998)
4. Metacognition and metacognitive strategies (Flavell, 1979; Nelson, 1996)
5. Help seeking (Karabenick, 1998)
6. Participation in communities of learners (Brown & Campione, 1996; Wenger, 1998)
7. Assessment (Biggs, 1999a; Biggs, 1999b)
8. Motivation (Wigfield & Eccles, 2000)?

Such issues are relevant because they comprise key elements of contemporary discussions about the psychology of instruction and consequent recommendations for educational practice. Furthermore, what do teachers understand about learners' understandings and what do learners understand about the interaction between teaching and learning? Does earlier research, such as Tasker's (1985) gap, still hold true given two decades of explicit teaching pedagogy (for example, see Westwood, 1997), or does a Piagetian perspective (Klein, 1996) dominate? There appears to be scope to extend earlier work by going beyond placing people's understandings along reproductive--constructive hierarchies, or surface—deep dimensions, to investigate more deeply how understandings in areas such as knowledge of strategies for learning *interact* with conceptions of learning. Indeed, it might be that understandings are better conceptualised as *networks of understandings* and my study seeks evidence for this possibility.

Research Questions

If the educational community is to be fully informed about the factors that influence the success of educational programs, then they must have information about the understandings that teachers and learners bring to educational settings. Therefore my research aims to investigate teachers' and learners' understandings about teaching and learning more deeply and widely than is currently represented in reports in the relevant literature. Simply stated, my broad research question is,

"What are teachers' and learners' understandings about teaching and learning?"

Subsidiary questions include

1. "Are teachers' and learners' understandings congruent with each other?"
2. "Are teachers' and learners' understandings congruent with current theoretical perspectives as represented in the teaching and learning literature?"
3. "How are people's understandings best represented—as dichotomies, dimensions, hierarchies, or networks?"

METHOD

Anonymity

All personal and site names used in this paper are pseudonyms.

Participants and Sites

I conducted taped interviews with a purposive (Miles & Huberman, 1994) sample of 10 teachers and 76 learners. These interviews lasted from about 20 to 90 minutes, with the average being about 45 minutes. A few of the younger school students were interviewed in pairs to facilitate their feeling comfortable with the interview situation. I also collected approximately 100 short written responses and some roving, five minute, 'in-class' interviews, so as to access the perspectives of whole classes of school students in single lesson periods.

Figure 1 displays the seven sites, categorised by type of learning institution, and nine classes included in this study. I aimed to access as wide a variety of teachers and learners as possible, while keeping in mind limitations such as time and cost. Thus I approached sites that would give me a range of age groups (grade 3 to adult), levels of education (primary, secondary, further education, pre-entry and graduate entry university) and inner- and outer-metropolitan and rural South Australia.

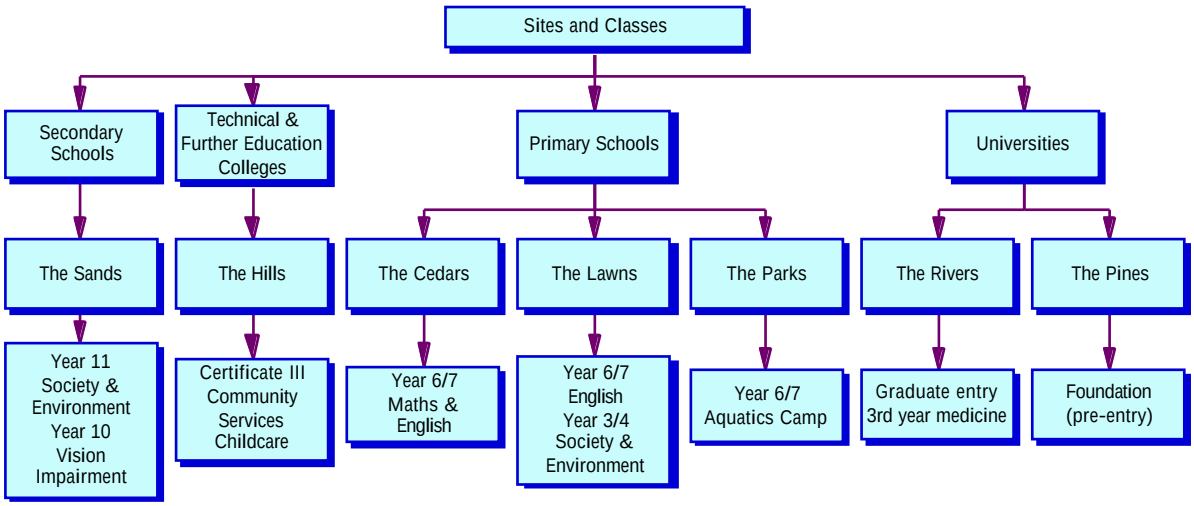

Figure 1: Sites and Classes

Voluntary Participation

After receiving permission from management at each site, I addressed each class group and their teacher(s) verbally and in writing. I outlined the nature of my research and distributed a list of my interview questions. I then requested volunteers to answer my interview questions. All participants gave voluntary consent. I also obtained parental consent for school age students.

Limitations of this study

Voluntary participation raises the question of whether the views of people disinclined to volunteer are different to people inclined to volunteer. Ethically it is not supportable, and practically it is not fruitful, to interview people who do not give voluntary consent. Therefore potential bias in the nature of volunteer responses must be recognised as a limitation of this study.

Another source of potential bias is the interpretive framework of the researcher. Sturman (1999) called for transparency at all stages of data collection and analysis so as to establish credibility of method and results. My data collection, analysis and synthesis procedures follow Sturman's advice.

Further, it is clear that this is a small study of less than 100 participants. The aim is not to make claims that what is interpreted from the data in this study will necessarily apply to other people. Rather, issues of generalisation and applicability are better understood as being a contribution to analysis and theory, as explained by Miles and Huberman (1994, p. 27-28) in their study of role modeling in a kindergarten:

> Sampling like this, both within and across cases, puts flesh on the bones of general constructs and their relationships. We can see generic processes: our generalizations are not to "all kindergartens," but to existing or new theories of how role modelling works. As Firestone (1993) suggests, *the most useful generalizations from qualitative studies are analytic, not "sample to population."* (my italics)

This issue was also considered by Cobb (2001 p. 549-460) in his discussion of the generalizability of design experiments: "This is generalization by means of an explanatory framework rather than by means of a representative sample."

Interviews

My aim was to comprehensively capture each participant's understandings about their own teaching and learning *in action*. This was based upon my recognition of the importance of all three vertices of Bandura's (1997) cognition, environment and behaviour triangle of social-cognitive theory, as well as heeding the role that context plays in teaching and learning (Lave, 1988; Wenger, 1998). Therefore the explicit focus of each interview was each participant's current lesson, topic and/or course. I used the interview questions listed in Table 1 to guide the direction of each interview. I also added extra probing questions according to the idiosyncratic direction that each interview took.

The interview data was supplemented by my non-participant observation and note-taking of each teaching -- learning setting so as to provide contextual information that would provide a background to the interview data.

Interview Questions.

Founded in the theory introduced on page 294, I composed a set of 18 interview questions. The interview questions are not exhaustive, given practical limitations, but are extensive and seemed manageable. Table 1 displays those questions. Column 1 indicates the theoretical field that precipitated each question. Column 2 lists questions designed to elicit information from teachers about their understandings in each field. Column 3 lists matching questions for learners.

Table 1: Interview questions

BACKGROUND THEORY	QUESTIONS FOR TEACHERS	QUESTIONS FOR LEARNERS
Goals	What do you want your student/s to achieve from what they are doing in this lesson/topic? Why?	What do you want to achieve from what you are doing in this lesson/topic? Why?
Theory of intelligence	How well do you expect your student/s to perform in this lesson/topic? Why? Can that be changed?	How well do you expect to perform in this lesson/topic? Why? Can that be changed?
Metacognition	What thinking processes will students be using in this lesson/topic?	What thinking processes will you be using in this lesson/topic?
Self -regulation	In what ways are you responsible for the learning in this lesson/topic? In what ways are your students responsible?	In what ways are you responsible for the learning in this lesson/topic? In what ways is your teacher responsible?
Assessment	How will you know that your student/s have learned what they are meant to?	How will you know that you have learned what you are meant to?
Objectives	What specific things do you want your students to learn from this lesson/topic? What broad understandings or ideas do you want your student/s to get from this lesson/topic?	What specific things are you meant to learn from this lesson/topic? What broad understandings or ideas do you think you are meant to get from this lesson/topic?
Purpose	Why are you teaching this? When, where and how will your student/s use the learning in this lesson/topic?	Why are you learning this? When, where and how will you use the learning in this lesson/topic?
Strategies	How will your teaching and learning strategies help your students to learn?	How does what you are doing help you to learn what you are meant to?
Value and Interest	Is this what your students want to learn? Why or why not?	Is this what you want to learn? Why or why not?
Communities of learners. Strategic help seeking.	Who and/or what helps your students to learn? How?	Who and/or what helps you to learn? How?

DATA ANALYSIS

I have not yet completed my analysis of all of the interviews, therefore the data reported herein is provisional and part of my work in progress. Interviews were transcribed verbatim. I employed NUD*IST 4 (QSR, 1997) data analysis software to categorise and code the interview transcripts. I then exported the NUD*IST category trees to Inspiration© (Helfgott & Westhaver, 2000) display software.

Categorisation of Units of Meaning

I categorised each *Unit of Meaning* in each transcript using a combination of *deductive* categorisation and *inductive* category formation (Miles & Huberman, 1994). The deductive categories are grounded in the three foundations that underpin this study as outlined on page 1[1]. I labeled the deductive categories "Domains" (5) and "Constructs" (10). These are represented in *Figure 2.*

[1] In brief, 1) a philosophy of intentions, plans and actions; 2) social-cognitive theory including motivation and self-regulation 3) cognitive psychology and constructivism.

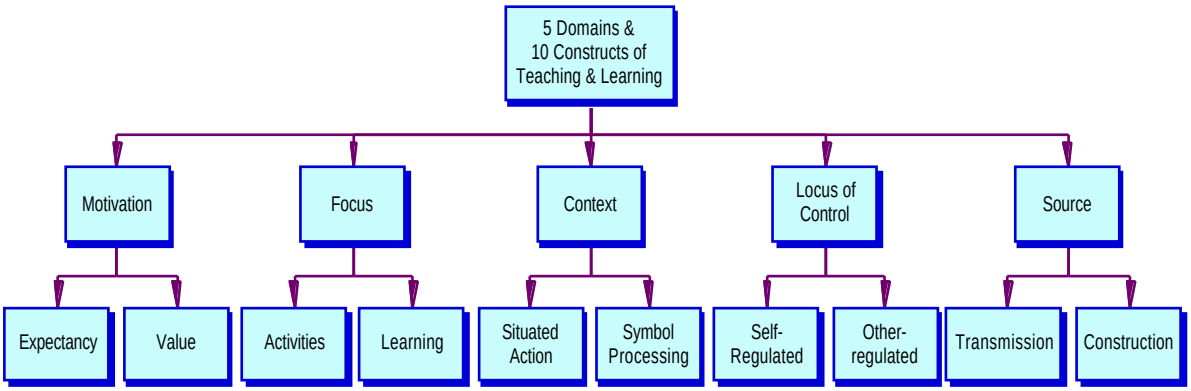

Figure 2: Domains and Constructs in Teaching and Learning

Figure 2 includes, from left to right; expectancy—value constructs in motivation (Wigfield & Eccles, 2000); a focus upon activities versus a focus upon meaningful learning (Bereiter & Scardamalia, 1989); the contexts provided by situated action and symbol processing (Anderson, 2000; Wenger, 1998); self- and other-regulated loci of control (Zimmerman, 1998); and constructivist versus transmissionist philosophy and pedagogy (Bransford et al., 1999; von Glasersfeld, 1995). Together these broad Domains and Constructs provided a comprehensive coverage of the Units of Meaning in the hundreds of pages of transcripts obtained in my study.

Figure 3 illustrates an example of the categorisation process for one small section of Rory's transcript. Reading from left to right, I first divided Rory's transcript into Units of Meaning. One of those units of meaning was "Learn by being here" which I will use to illustrate each step of the categorisation process. It can be seen that I allocated "Learn by being here" to the Domain: *Context* and the Construct: *Situated Action* (from *Figure 2* above). I then created the inductive Theme "Learn by being here" which reflects Rory's own words, and next I included Rory's Elaborations of that Theme, such as "osmosis." I then added the Elaborations "watching" and "asking questions." Had Rory elaborated further, I could have continued to expand the figure on the right hand side.

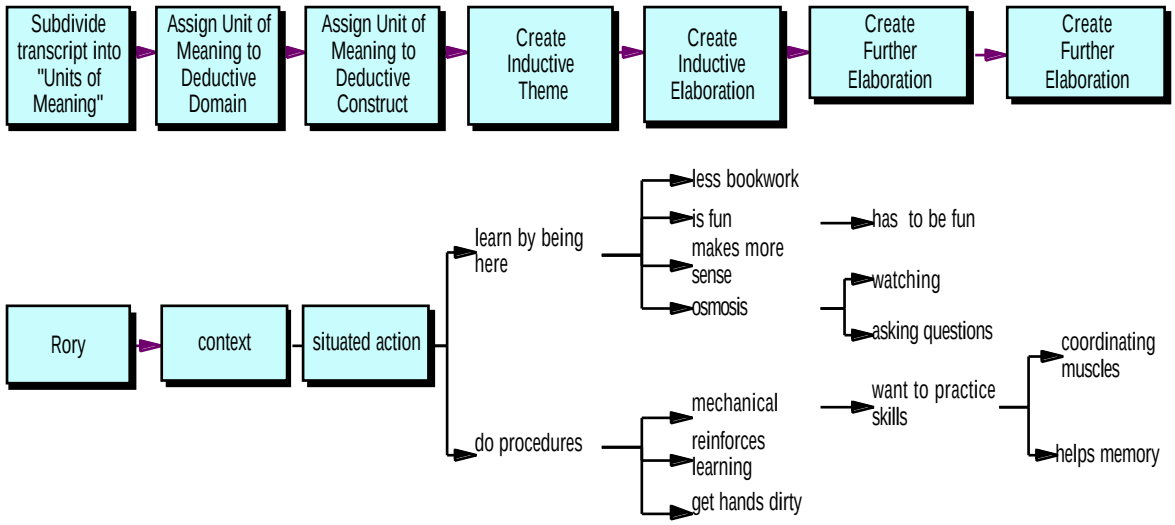

Figure 3: Example of categorisation

The detailed categorisation and display of data discussed above worked so as to, in a qualitative sense, "standardise" the data. Clearly this standardisation is not in the quantitative sense of, say, calculating Z scores. However, the uniform processes of categorisation and display brought the understandings of participants into a common framework, enabling accessibility and interpretation. This procedure also makes my data analysis procedures explicit, thus allowing readers to audit the veracity of any interpretive claims I might make.

RESULTS AND DISCUSSION

Figure 3 displays the process I undertook for analysing and displaying each participant's transcript. The process resulted in 10 or more displays for each participant, thus enabling comparisons and contrasts. I will turn now to a synthesis of the data obtained from my analysis of the transcripts.

Integration of the Ten Constructs of Teaching and Learning

My major interpretation of participants' understandings is that participants appear to *integrate* the ten Constructs of Teaching and Learning that I have used as theoretical foundations for this study. For example, Sally (medical student) indicated that she was confident in her own ability, that she had a busy brain that made fast connections, and that she wanted to impress other people (entity theory/performance goals). She also told how she invested a lot of effort into her study and could become frustrated with herself (incremental attributions/mastery goals) (Dweck, 1999; Dweck, 1986; Pintrich, 2000). Sally takes responsibility for her own learning while recognising the role that other people play in informing her about what is expected of her (Bransford et al., 1999). Sally knows that there are various sources of knowledge that can be transmitted to her, but she is not passive in this process. She has a range of strategies that facilitate her taking an active role in knowledge construction, including "having a go" and knowing that in doing so it is "OK to be wrong." She uses surface and deep strategies for learning (Biggs et al., 2001) and holds low and high level conceptions of learning (Marshall et al., 1999). Sally holds extrinsic (future employment prospects) and intrinsic (interest and personal fulfilment) motivations (Murphy & Alexander, 2000).

This integration of constructs also seems apparent in the transcripts of other participants. To interrogate this integration further, I created a Construct X Construct[2] matrix from the medical cohort's transcripts (7 students, 1 mentor) which is reproduced as Table 2. Each cell of the matrix highlights a Unit of Meaning that suggests integration of two Constructs.

Table 2 illustrates, for example, that the statement "complement experience with book learning, see first, read first, doesn't matter" can be interpreted as an affirmation of the positive benefit of situated action and symbol processing working together to promote learning. Another example, "learning is a shared responsibility between student and supervisors" illustrates an interaction between self- and other-direction. A third example, "information comes to you -- ask questions" illustrates an interaction between transmitted information and constructing knowledge. The presence of numerous interactions in participants' understandings leads me to begin to raise questions about dichotomies that appear in the literature. I will discuss some of these interactions in further detail under separate headings below.

[2] The ten Constructs are displayed in *Figure 2.*

Table 2: Medical cohort -- Construct X Construct interactions

	expectancy	value	activities	learning	situated action	symbol processing	self	other	transmission	construction
expectancy										
value										
activities	cramming before an exam	some things not relevant/interesting								
learning	confident to do alright _have self doubts	be a good doctor	exam is small part of learning medicine							
situated action	not an effort to learn	like going to work - exciting-feel alive-useful		osmosis-learn by being there						
symbol processing				provides foundation knowledge	complement experience with book learning-read first-see first-doesn't matter					
self-direction	I can do this			integrate learning experiences with curriculum guide	put myself in the position that I'm getting the experience I want	sit down and read				
other-direction	please my GPs		supervisors think some things are important-I don't	inspiring people	mentor checks your work		learning is shared responsibility between student and supervisors			
transmission				lectures-the facts	learning from expert	books present information nicely	.listen-watch-be there	tutors impart knowledge from their experience-terrific to learn that from them		
construction		assimilate a broad understanding treat patients better		join categories together-new understandings open up	patient presentation raises a question in your mind	draw pictures & diagrams-pattern learn	try to make sense of it-what does it mean	be questioned-be challenged	information comes to you-ask questions	

Approaches and Conceptions of Learning

Biggs (Biggs et al., 2001; Biggs, 1979; Biggs, 1987) argued that students will adopt deep or surface *approaches to studying* in interaction with the affordances of the learning environment. Participants in the present study certainly appear to hold deep and surface approaches to studying. However, whereas Biggs et al. (Biggs et al., 2001 p. 142) proposed that deep and surface approaches are, "negatively correlated since deep and surface approaches are envisaged as not commonly occurring in conjunction," the participants in this study appear to be able to hold deep and surface approaches *in conjunction* and to utilise both approaches as valuable resources for learning. These "in conjunction" approaches seem to apply to both the strategy and motive sub-components of deep and surface approaches. This is in contrast to some of Biggs et al's findings: for example, that surface strategy and deep motive covary negatively (2001 p. 144).

Memorising. Figure 4 displays how Johanna (medical) told how she "swats like mad" as part of accumulating knowledge, and that swatting provides her with the information she needs to allow "new understandings to open up." Swatting might be important to combat forgetting, because "some goes away," (Nuthall, 2000a; 2000b), but Johanna understands that when the time comes for her to "use it again" she will "remember more" and that she will not be "trying to understand it the next time." Nor does she have to remember it all, as long as she understands the principle. Most interesting is Johanna's comment that the plan is to "have it all in your head at once," that is, the swatted knowledge, the broad understandings, and the real life. My interpretation of Johanna's complete transcript is that she has deep motives for learning. The Units of Meaning in *Figure 4* suggest that Johanna is adopting deep strategies for learning, and also, that one of her key strategies--swatting--is surface.

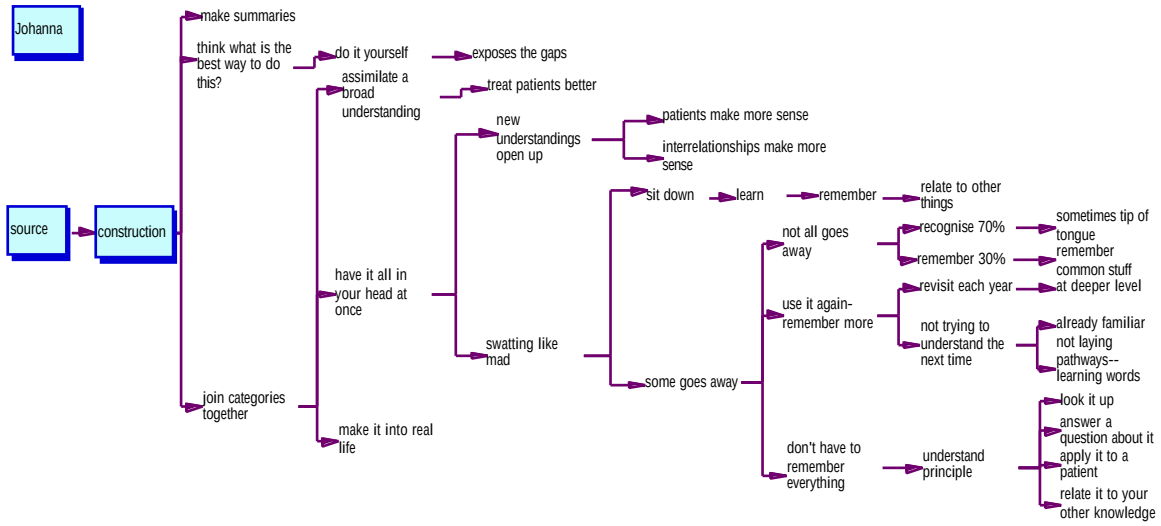

Figure 4: Johanna--construction

Participants spoke of other strategies that could be categorised as surface, such as reading over and over, repeating without looking, memorising and practising the items on competency check lists. As in Johanna's case, such surface strategies were integrated with deep strategies such as drawing flow charts and having discussions as, well as with deep motives, such as "be a good doctor" or "be a good child care worker." It is interesting to note a remarkable similarity between Sally, in her 6th year of high achieving university studies, and Amber, in her 6th week of Foundation level university pre-entry studies: Sally had pasted to her kitchen wall, and Amber had pasted to her bedroom ceiling, pictures of what each was trying to memorise. School students did not seem to be as concerned with understanding and remembering information, but instead spoke of reproducing and presenting information.

Base Knowledge. In part, the need to memorise appears to stem from participants' understandings about the importance of acquiring extensive quantities of base knowledge necessary for further development in their field. Indeed, John lamented that he was a "hopeless rote learner." He saw rote learning as a valuable resource for acquiring essential information necessary to be a good doctor -- a deep level motive. Many participants spoke of the need to accumulate a 'base' or 'foundation' of knowledge. This knowledge is not the kind that they could work out for themselves, but is what needs to be learned from authoritative sources. It is also the knowledge needed to enable deep thinking about issues such as case management, dealing with children, or constructing an academic argument.

Memorising has been identified in the literature as a lower-level learning conception and as a strategy associated with surface motives for learning. Marshall et al. (1999) placed memorising at level A (lowest) and Marton et al. (1993) placed memorising at level B (second lowest) in their hierarchies of conceptions of learning. Furthermore, Biggs et al's (2001 p. 148) Study Processes Questionnaire items that refer to memorising and rote learning are surface strategy items:

> 8. I learn some things by rote, going over and over them until I know them by heart even if I do not understand them
>
> 11. I find I can get by in most assessments by memorising key sections rather than trying to understand them.

An alternative view might be that learning by memorising is a valuable cognitive strategy for dealing with extensive quantities of base knowledge, with the eventual aim that such base knowledge will provide the necessary building blocks for deeper-level learning.

Teaching by telling (transmission). To take my synthesis of participants' understandings further, participants explained how information that was "told" to them by other people (texts,

lecturers) was considered to be equally as valuable as information they constructed from their own experiences.

> I think they have a responsibility to impart the stuff to us that isn't in the textbooks, the sort of practical stuff they've gleaned over the years, like how to examine a screaming baby. You know how to examine the baby but if it's all upset, you can't hear its heart and all that kind of thing, what do you do? That sort of practical stuff is just really terrific to learn from them ….

Teaching by telling could be seen as a transmissionist methodology that evokes a surface approach in learners (Trigwell, Prosser, & Waterhouse, 1999), as opposed to active involvement in hands on, minds on learning activities (Tobin, Tippins, & Gallard, 1994). However there are many instances in the transcripts where participants who could be considered to be adopting a deep approach to learning, or operating at a high level of conceptions of learning, understand teaching by telling to be an essential resource for deep learning. For example, *Box 1* tells what Johanna had to say about the responsibility of tutors.

Box 1: Johanna--teaching by telling

Learning by "absorption." Conceptions of learning theorists, such as Marshall et al. (1999) and Marton et al. (1993) have proposed a qualitative distinction between lower- and higher-level conceptions. For example, Marshall et al. and Marton et al. rate "absorption" as a low-level conception. However, many medical and child care students value absorption, or in alternative terminology, "osmosis" (in the context of situated action) as a way of achieving deep-level learning goals. An alternative interpretation to that proposed by Marton et al. and Marshall et al. might be that absorption could be classified as a high level approach, for example in gaining practical intelligence (Sternberg, 2000), in gaining tacit knowledge (Edwards & Mercer, 1993), in learning about the contexts of action (Wenger, 1998), and in the ways that different cultures teach and learn (Stigler & Hiebert, 1999).

Approaches and conceptions of learning summarised. Previous 'approaches to studying' interpretations have tended to indicate that the person 'adopts' or is 'located at' a particular place on a learning dichotomy in interaction with a particular teaching and/or assessment style, and, furthermore, that surface approaches are inferior to deep approaches. For example, Biggs et al. (2001 p136) stated

> A student, who typically picks out likely items for assessment and rote learns them, finds that strategy won't work under portfolio assessment, so goes deep. Another student who normally interacts deeply, may decide to go surface in a module that is overloaded with content and assessed by a poorly constructed MCQ. Indeed the generic aim of good teaching is precisely to encourage students to adopt a deep approach and to discourage the use of a surface approach (Biggs, 1999).

My interpretation of participants' understandings suggests that it may be fruitful to seek a more complex representation of surface and deep approaches to learning. One possibility is that learners can exploit surface level strategies whilst motivated by the pursuit of deep level goals, or higher level conceptions of learning. A second possibility is that the decision to adopt surface or deep approaches to learning is influenced by an interaction of factors over and above the method of teaching or the format of assessments. For example, adult participants spoke about the interaction between the volumes of information to be mastered in the limited time available. Even Amelia, in Year 4, when asked, "What was happening in your head [in the lesson]?" replied, "Hurry, hurry, hurry." Time is a realistic constraint. Also, many participants referred to motivations such as interest, employment and previous life experiences as influencing what they were prepared to do to learn. This places approaches to learning into a much broader framework than the affordances of the existing teaching -- learning situation.

The issue seems to be the *level* of analyses. It is uncontroversial to say that at the level of a whole course of study, a deep level approach, and learning leading to a changed conception of oneself in interaction with the world, is desirable. However, some of the participants in this study seem to suggest that at a task level, surface level strategies may not compromise deep level motives. This interaction between surface strategies and deep motives might provide an explanation for the variable results that Biggs et al. (2001) found in isolating an "achievement" approach to learning. Furthermore, in practical terms of class size and teaching resources, there may be some benefit in assessing exactly which learning can be profitably approached using surface strategies, so as to free up resources for deep learning in other domains. It seems that some participants in this study are indeed making that assessment for themselves.

As well as approaches to studying, there seems to be scope for re-assessing existing descriptors of levels of conceptions of learning. Memorising and absorption are considered by many participants in this study to be valuable strategies to enable goals of "being a good doctor/child care worker." The value of such strategies for achieving goals of dealing with substantial quantities of information, and in learning about the intricacies of complex situations, could be reassessed.

Goals

As with my preceding discussion about approaches to learning, my analysis of participants' interviews suggests that it may be facile to speak of mastery (deeply learn the material) and performance (show other how much you know) goals as a dichotomy (Dweck, 1999; Pintrich, 2000), as such goals appear to be able to operate simultaneously. *Figure 5* displays Sally's account of how her mastery goals of 'learning medicine' and 'being a good doctor' incorporated her performance goals of passing exams.

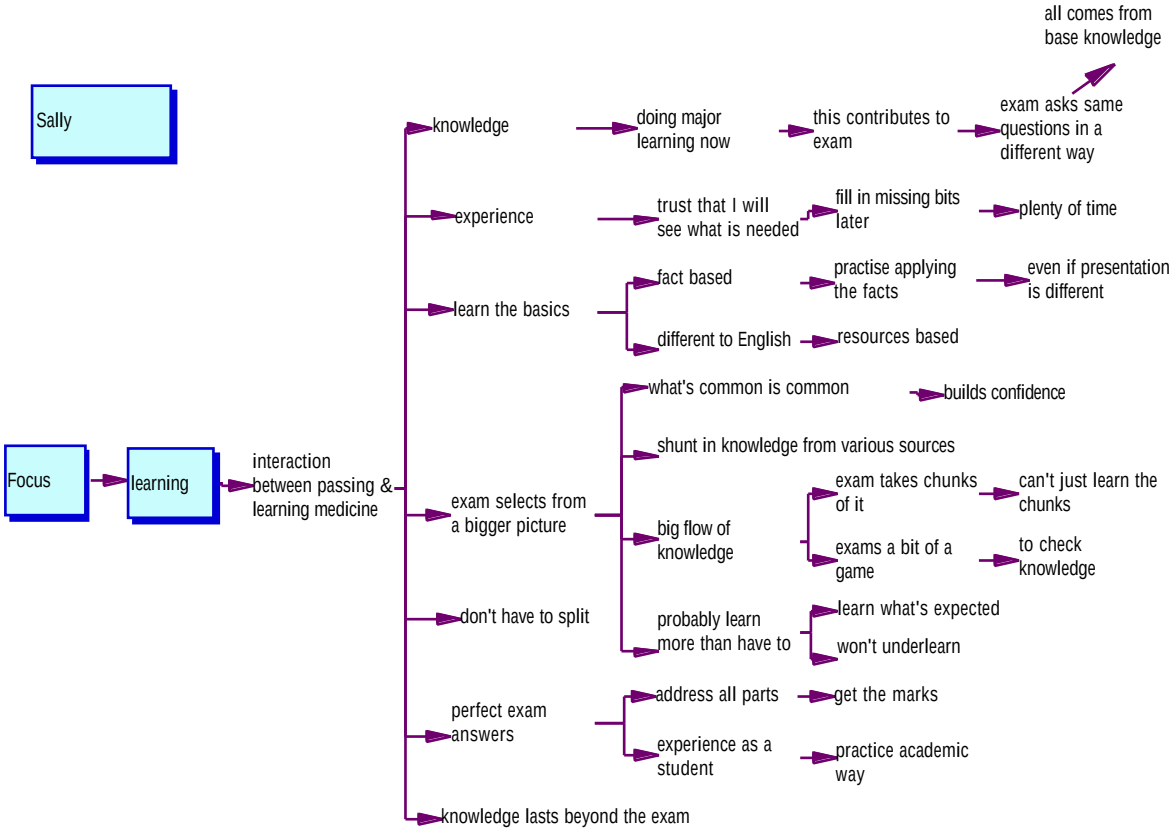

Figure 5: Sally--passing exams and learning medicine

Sally referred to the 'perfect exam answers,' 'address all the parts' and 'get the marks'. She also told of how the exam 'selects from a bigger picture' and that the knowledge 'lasts beyond the exam.' She said you 'don't have to split' exam knowledge and learning medicine - it is all the same knowledge. It is interesting to compare *Figure 5* with *Figure 6: Roxanne--focus—learning.* Roxanne also integrates passing exams and being a good doctor, however she adds an important caveat: that the two should go hand in hand, but don't due to limited time.

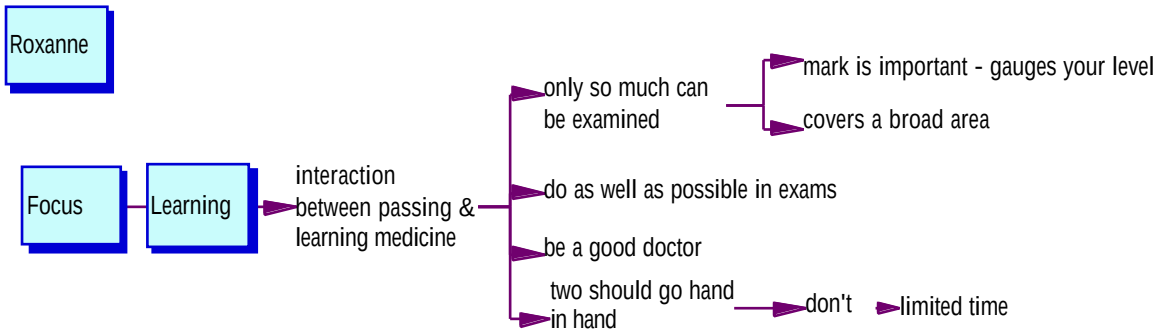

Figure 6: Roxanne--focus—learning

The child care students also described what they do to pass assignments (read and copy) compared to what they do to care for children – either in the childcare centre or with their family and friends ("think about what to do to meet the children's needs"). A possible application of achievement goal theory to the medical and child care students is that performance and mastery goals seem to work together in a complementary fashion rather than separately or as alternative perspectives. This seems to bear similarity to Zimmerman and Kitsantis' (1997) morphogenic goal theory, where mastery and performance goals come into play at different stages of the learning trajectory. Alternatively, Pintrich's (2000) achieving goal seems to capture the flavour of participants' mixing of the two constructs. A few students also differentiated performance goals into two: showing other people what you can do and showing yourself what you can do by way of passing external criteria such as exams.

Interviewees also highlighted the practical implications of passing or failing exams, thus adding many more parameters to decisions about adopting mastery or performance goals than might prevail in school classrooms or laboratory simulations. For example, Antoine (medical) warned of the dangers of learning certain things, such as one's special interests, too deeply. Why? Because such an approach would steal time from other essential learning. In the end, no matter how deeply a student learns about his or her special interests, s/he can't be any sort of doctor, let alone a good doctor, without passing the medical exams.

Amelia: Year 4
There was this thing in the hall -- a debate -- and it was on, 'we need homework or not.' And Madeline said, 'why do we need it -- it's easy -- I learnt this when I was little: cut -- copy -- paste -- print. And you get it off{the computer} and just stick it straight in your book and you don't read it. So if you copy it out yourself and out in your own words -- you understand -- it's in childrens' words, and it's sort of a bit easier for Mr H -- maybe not to read, but say we get a bit more points usually because you've read through it, and put it in your own words and you've done more work.

Box 2: Cut-copy-paste-print

A different picture emerges from the school students' transcripts. Many school students conveyed a sense of a performance orientation when they spoke about school work, but a mastery orientation when they discussed their out of school, personal interest activities. *Box 2* gives Amelia's description of a performance orientation to project work. Freda (Year11), Antony (Year 6), Amelia (Year 4) and Hanna (Year 4) told of how project work meant gathering together and re-presenting information.

Interviewer: So you don't play around or try different things?
Donna: You usually get sort of set things that you have to do - so can't really sort of change it too much cos you've got things that you have to do.

Box 3: Set things

However, when discussing her flute playing, Freda used words such as "invent," "fun" and "make new tones." Antony spoke of his drawing (at home) using words such as "kept trying and trying." Donna said that in learning how to use make-up, "You just sort of play around and see what works" and "Try different things." But that is not what happens in Australian Studies according to Donna's account in *Box 3*. These examples can be related to the work of Bereiter and Scardamalia (2000; 1989) who lamented that schoolwork often focussed upon activities and products (such as projects) at the expense of deep learning of subject matter.

It is enlightening to observe that school students do have understandings about strategies that help them to learn. They also appear to have understandings about when they will, or will not, adopt deep or surface strategies to achieve mastery or performance goals. This supports researchers' and practitioners' calls for creating institutional learning environments that maximise the potential for optimum teaching and learning behaviours (Biggs, 1999b; Brown & Campione, 1996; Paris & Ayres, 1994).

Theories of Intelligence

Dweck (1999) discussed people's disposition to adopt a malleable (I can get better at this) or fixed (this is my level) theory about their intelligence. The medical student Rory said that he was not super-intelligent; that he didn't work really hard; that he procrastinated; that he expected to do well in exams and had always done so; that he enjoyed exams as it was a chance to demonstrate to himself and others what he knew, and; that he was anxious about exams because he wanted to do well. This part of Rory's account identifies him as a fixed intelligence theorist. However, Rory also said that, as there was no need for him to perform well in exams (as his intern placement was already established) he was free to attend to his main medical interests; to have fun with his learning; to know his own deficiencies; to work out what he needed and wanted to learn; to seek out opportunities for learning; to be willing and available to learn; to establish good relationships with General Practitioners and staff to enable learning; to chase up learning; to monitor his own success using a framework of learning goals, and; to make notes, read up and think through what has happened. These deep learning strategies align with Dweck's description of what a person with a malleable theory of intelligence would do.

Rory was not alone. Other participants spoke about their learning as if they held both fixed and malleable theories. The interaction between the two theories is well illustrated by the Unit of Meaning "work at it to the best of my (their) ability" which was spoken by many teachers and learners. "Work at it" flows from a malleable theory of intelligence. "To the best of my [their] ability" flows from a fixed theory of intelligence. The complete Unit of Meaning implies and demands both. Note that this statement also hints at another kind of ability – the ability to apply effort, which was suggested by Stigler and Hiebert (1999) in their discussions about Japanese students' attributions for success or failure.

The most telling evidence for the variable influence of other factors upon theories of intelligence was provided by the Foundation students. Anne (Foundation) told of her previous understandings about her own ability and application of effort, summed up by her father's oft repeated taunt, "You're a bugger of a child." Anne said she wasn't a bugger of a child any more: she had the ability and could apply the effort. Amber (Foundation), who experienced similar demeaning feedback from her father as a child and as an adult, indicated that she was discovering that she appeared to have previously unrecognised abilities and, supported by her

husband, was now willing to apply as much effort as necessary to make the most of her ability. Ray (Foundation) told of how school never interested him, how he did poorly and how he left at the first opportunity. Now he has decided that life has more to offer than a succession of itinerant, physically demanding jobs. Although English is his second language, and although he has never written a page let alone a whole essay, Ray's understanding was that he wanted to learn, that he presumably had as much ability as anyone else, and he was prepared to "do what it takes" because he "wanted to"[3]. My interpretation is that participants hold much more complex understandings about their intelligence than is captured by the duality of "fixed" and "malleable" theories. From the transcripts, other interacting factors include self-efficacy in relation to the specific task or domain, the availability of a key support person, interest, desire, necessity, the freedom to choose to learn and the affordances of the teaching--learning environment.

As with approaches to- and conceptions of- learning discussed above, fixed and malleable intelligence theory seems to illuminate parts of, but not the complexity of, people's understandings. The danger, although it may never have been the intention of the authors, is that such theories may be interpreted by researchers and practitioners in a static, dualistic and individualistic fashion. For example, Biggs et al. (2001) stressed that the Study Processes Questionnaire (SPQ) is best used to measure, and even modified to fit, specific teaching contexts. Nevertheless, I suspect that the tendency would be to interpret responses to the SPQ to indicate that *individual respondents* occupy a surface or deep position which, although it may change over the duration of a course of study, does not change from task to task or situation to situation. Certainly the wording of some SPQ items encourages an individual rather than a contextual focus. Similarly, Dweck (1999), although proposing that individuals hold a fixed or malleable theory, demonstrated how it was possible to experimentally manipulate people's theories of intelligence with as little as one intervention, thus clearly accounting for the influence of context upon people's fixed or malleable view. My assessment from the interviews in the present study is that the explanatory frameworks of dualistic theories pay insufficient attention to the interactions that occur within each individual's understandings and between each individual and each situation.

Situated Action

Many participants described the difference in effort required when learning in a situated or, in more common terminology, 'hands-on' learning environment, compared to learning from books or lectures. Possible reasons for learning in situated action making learning less effortful include that

1. Additional contextual cues are provided by sights, sounds, touch, emotions and social interactions.
2. Contexts promote and provide opportunities to construct and ask questions.
3. Students may lack essential metacognitive skills for text-based learning.
4. Hands-on activities might work towards precluding a 'surface approach' to learning. For example, it may be less possible to 'skim over' real time experiences as it is possible to 'skim' a text. Also, it may be less possible to disengage from the sensory and emotional contexts of human interaction than it is to disengage from text. Thus a deep, rather than surface, approach to learning might be enabled by a situated approach.
5. Opportunities are provided for practice but with slight variations in context with each repetition. Note that such opportunities for practice are not restricted to simplistic interpretations of motor skills such as suturing or nappy changing, but can refer to

[3] Ray was awarded a distinction for his first ever university essay.

complex aspects of situated practice, such as developing client relationships, applying mental models, selecting follow up investigations and proposing solutions.

A potential explanation is that learning in situated action stimulates multiple sensory inputs, which in turn stimulate diverse cognitive activity. This diverse brain activity helps to overcome problems of inaccessibility of inert (Whitehead, 1942) unconnected (Anderson, 2000; Bereiter, 2000; Lakomski, 2000), non-transferable pieces of information (St Julien, 2000) and facilitates remembering.

My assessment is that learning in situated action looms as a major issue in participants' understandings. In an attempt to investigate this further, I constructed Table 3, which amalgamates the medical cohort's understandings about situated action. An analogy can be drawn between Table 3 and a quantitative factor analysis. Each column is dedicated to a participant. Each row identifies common Units of Meaning (variables) that appear in the medical cohort's transcripts. I have allocated an interpretive title to each row (or factor). I have then placed the 11 interpretive titles (factors) under the common umbrella of the higher order factor "Situated Action."

Table 3: Medical cohort -- situated action

	Context-- situated action							
	Rory	Sally	Antoine	John	Roxanne	Troy	Johanna	Dr Be
Mentoring		expert checks you	better access to doctors		get GP perspective	one on one experience	one to one with GP	mentor shows student
Apply to real life	reinforces what you've learnt already	see patients-not in textbook way-apply medical model	apply theory to patient		seeing things in real life	patient gives symptoms-you think and apply knowledge	apply theory to patient	connect base knowledge to patient presentation
Osmosis	osmosis-watching asking questions	osmosis theory-learn by being there	see things-don't realise how much I've learnt		exposed to it	seeing patient better than book learning	absorb-not an effort to learn	easier to learn when you see things
Apprentice-ship	learn by being here-makes more sense	have a go-like an apprentice-ship	broad experience-remember people-relevant	perform in the role-like an apprentice-ship		put me in the environment-allow me to train-like apprentice-ship	like an apprentice-ship--don't have to sit down & learn it	
Affect	fun	on job training-can't imagine any other way	see things-affects me	like it more	learn the whole process - more three dimensional	Like a worker-patient forces you to be active-it's energising	like going to work--feel alive	throw in at deep end
Practise	practise skills	practise					practise	
Have a go	do procedures-get hands dirty-reinforces learning	get hands dirty	hands-on	good with my hands	get hands-on experience	hands-on	get practical experience that isn't in books	do things
Safety net	always under supervision	GP vets work	supportive environment			GP always there to check		let student express his/her opinion first
Take Responsibility		work with the patient myself	you're the assistant	make own decisions-challenged	being responsible for all aspects of being a doctor		Think-what is the best way to do this	examine patients-diagnosis
What's common	what's common is common	what's common is common	what's common	common problems	common & rare things		pick up on common things	what's common also rare things
Unstructured		whatever comes through the door	whatever procedures are happening for the day	learn what comes in the door		you just get whatever walks through he door	whatever comes in the door	depends on what comes through the door

The interpretive titles for each row of Table 3 identify key features of learning in situated action, including; the guidance of a mentor; the opportunity to apply your knowledge to real life situations; the apparent ease of learning in practice; the comparison with an apprenticeship model; the positive affect created by the learning situation; opportunities for practice; having a go; the need for a safety net provided by more experienced staff; the opportunity to take responsibility for making one's own decisions; that everyday practice illuminates what is

common (and therefore necessary to know), and; the unstructured nature of the learning environment.

In particular, many participants indicated that learning in situated action is easier, as is captured by *Figure 7*: Jenny (childcare) and *Figure 8*: Johanna (medical). Jenny doesn't have to "shove the learning in" and for Johanna it is "not an effort to learn."

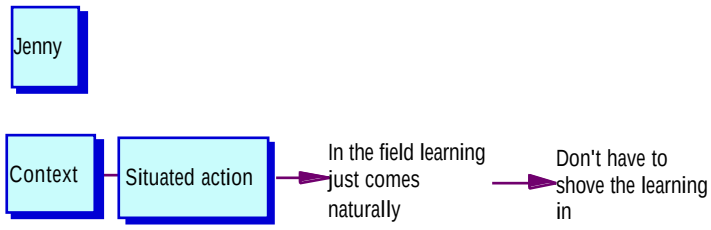

Figure 7: Jenny-situated action

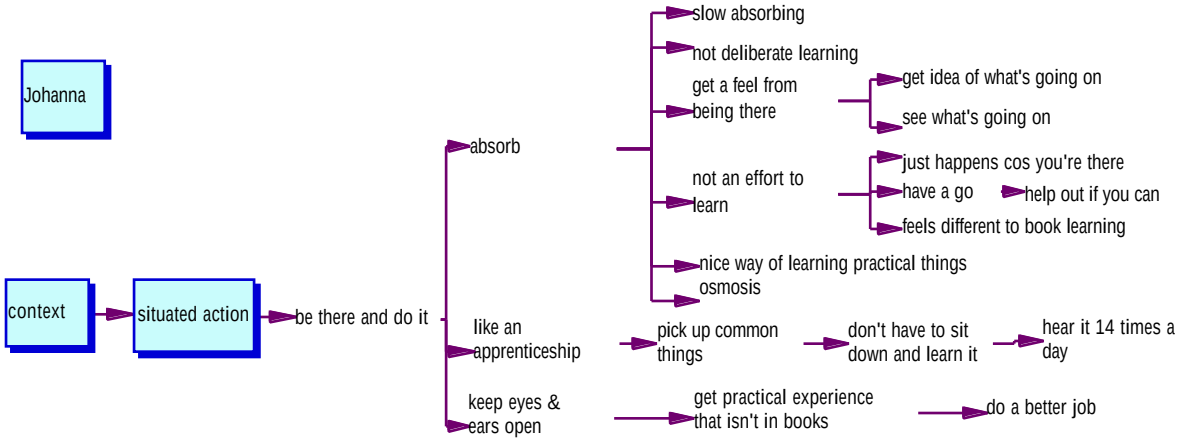

Figure 8: Johanna—situated action

Indeed, Anderson (1987 p. 473) argued that "our learning mechanisms are adapted to deal with complexity. In seeking laboratory simplifications, one may have thrown out the features that would reflect these adaptations to complexity." My hypothesis then, is that situated action embeds knowledge in the complexity of meaning, or pattern, which is another way of saying establishing multiple neural connections, thus making learning less effortful.

Integrating Theory, Practice and Reflection

An interesting aspect of two of the cohorts in this study -- medical and childcare -- is the course(s) design, that juxtaposes opportunities to learn from situated action and opportunities to learn from books (and other texts). Roxanne (medical) described how learning from texts gave her a two-dimensional kind of knowledge. However, when she added her patients to her two-dimensional knowledge she created a much more rich three-dimensional knowledge structure. An impression that emerges from many medical and childcare participants' transcripts is that the temporal combination of theory and practice multiplies to facilitate learning more than a simple addition of the two parts. All of the medical students spoke about the interaction between theory and practice. For example, Roxanne and Troy said that real life situations identify what is important and so directs their reading and John described how he would sit in with surgeons and read up about it later. Childcare students and their teacher told of how they may deal with an anxious child as a learning issue in a lecture session and within a few days be called upon to deal with such a child in the childcare centre.

Figure 9 displays Lauren's (childcare) account of the integration between learning from books and learning in practice. Lauren describes how "putting what they tell you into practice" is "not just sitting getting the information" but "taking it in and doing it," allowing her to "see that you can do it". She says that "books help you with your work" and that the course is able to "give me the information I need and the opportunity to put it into practice." Clearly theory and practice are essentially integrated in Lauren's understanding about effective learning.

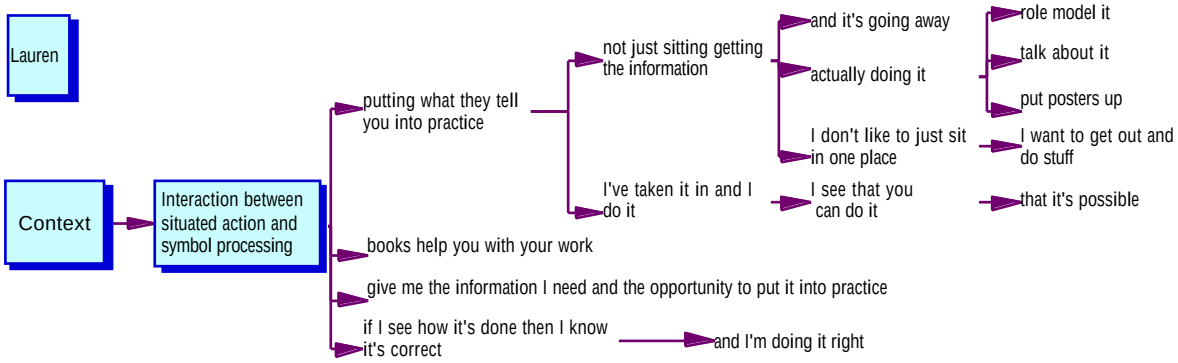

Figure 9: Lauren--Interaction between situated action and symbol processing

Possible reasons as to why the temporal combination of the theory and practice might work so well include that

1. The practical and text experiences provide multiple exposures to the material to be learned: an essential precondition for learning as described by Nuthall (2000a; 2000b)

2. The structure of the learning environment allows a combination of practical experience with time for reflection and follow up of learning issues. Time for reflection, as opposed to another round of frantic practice, is an essential pre-condition for constructing knowledge (Alagumalai, 1999; Baird, Fensham, Gunstone, & White, 1991; Bruning, Schraw, & Ronning, 1999; Day, 1999). A combination of theory, practice and reflection also accords with Hill's (1999) recommendations (albeit Hill referred to teacher education). Reflection is also an essential component of self-regulated learning (Schunk & Ertmer, 1999; Zimmerman, 1998).

Koschman (2001) (after John Dewey) called for a transaction between learning as individual acquisition and learning in social practice. The beneficial integration of individual study of theory, legitimate practice in a like minded community and time for reflection, as described by participants in this study, might provide a model of how such a transaction can be facilitated in teaching -- learning settings.

CONCLUSIONS AND FUTURE DIRECTIONS

This paper has described an "in progress" interview study that seeks answers to the broad research question, "What are teachers' and learners' understandings about teaching and learning?" I have reported only a small fraction of many hundreds of pages of interview transcripts collected for this research. However, this paper begins to give a description of the broad and deep understandings that teachers and learners hold, including understandings about motivation, learning in situated action, self-direction of learning and constructing learning.

My first subsidiary research question was whether a 'gap' appeared between teachers' and learners' understandings. In general, I have not found evidence of a gap between teachers' and learners' understandings about the purposes of their joint endeavours. Although there may be

task-specific, short-lived misunderstandings, or disagreements between teacher and student as to what is relevant to learn (such as John's annoyance with the professional development module of his training), the overall purposes of learning (to get the knowledge required to be a good doctor/to be a good child-care worker/to learn how to prepare an academic argument/to prepare for adulthood) were shared between each teacher and their students. Even questionable or vague purposes (We're doing this in primary school so we can do it in high school) were explicitly shared.

The second subsidiary research question was whether there is congruence between teachers' and learners' understandings and contemporary literature in educational psychology. Whereas participants identified many issues that are currently represented in the literature, my assessment is that participants appear to hold understandings in interaction, especially in interaction with context. Examples include the exploitation of surface strategies for deep learning; the interaction between fixed and malleable theories of intelligence; the potential to concurrently hold mastery and performance goals; the relative ease of learning in situated action, and; the apparent multiplicative learning effect of integrating individual learning from texts with learning in the social contexts of situated action. Participants have provided a more complex representation of understandings than is afforded by the literature, or at least, participants' understandings are not transcontextual (Behrens & Smith, 1996). I propose that investigations into teaching and learning afford a more equal balance between the influence of individual dispositions *and* the influence of contexts.

The third subsidiary research question was to determine how the complexity of people's understandings is best represented, as dichotomies, dimensions, hierarchies, or networks. There is little evidence in participants' transcripts for *dichotomies*. I have portrayed understandings as Domains, Constructs, Themes and Elaborations in the many Figures included herein. This classification system is loosely hierarchical, but that hierarchy has been imposed by me in the process of bringing some order to the data. I have questioned the *dimensions* of surface and deep approaches to studying, and the *hierarchical* conceptions of learning, and have posited that such schemes fail to take into account interactions between numerous variables. My interpretation is that participants' understandings are best conceptualised as networks of understandings, containing patterns of multiple variables and multiple interconnections. This broader conceptualisation seems worthy of further investigation.

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